M.Eng Project Opportunity: Optimizing the Scheduling Process for Battery Assembly Manufacturing

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Lab/Group: CMORE/DORL

Project Description

This project aims to address a real-world scheduling problem in battery assembly manufacturing using traditional optimization methods.

Please contact the project lead for more information.

Key Objectives:

- **Objective 1:** Create a discrete event-based simulator based on real world production data
- **Objective 2:** Formally define the scheduling problem and solve using traditional mathematical optimization techniques, such as a Mixed Integer Program.
- **Objective 3:** Propose and implement a mathematical model, such as a Mixed-Integer Program, to calculate and analyze optimal schedules.
- **Objective 4:** Validate the model's effectiveness by testing it on various scenarios using a data generator.

Student Responsibilities

- Assist in the development and implementation of a mathematical optimization model for the scheduling problem.
- Program the model using optimization solvers and analyze the results.
- Visualize scheduling outputs, for instance by creating Gantt charts to communicate the optimal schedule.
- Participate in weekly (or biweekly) progress meetings and contribute to project documentation and potential research papers.

Required Qualifications

- **Academic Program:** Currently enrolled in a graduate program in Industrial Engineering, Computer Science, Operations Research, or a related field.
- **Technical Skills:** Proficiency in **Python** is required.

- **Theoretical Knowledge:** A strong understanding of Operations Research methods, particularly integer programming.

Preferred Skills (Assets):

- Experience with optimization solvers (e.g., Gurobi, CPLEX).
- Knowledge of discrete-event simulation, as this is a foundational part of the project's long-term roadmap.
- Familiarity with production scheduling concepts.

What You Will Gain

- **Hands-on Experience:** Apply advanced mathematical modeling techniques to solve a complex scheduling problem using real-world principles and constraints.
- **Industry Exposure:** Tackle a practical industry problem, gaining insight into the trade-offs between creating an academically novel solution versus a practical, factory-specific one.
- **Research & Portfolio:** Contribute to a multi-year research project with the potential for an academic publication. The project will work with advanced techniques like Reinforcement Learning in the future.

Project Details

- **Duration:** at least 8 months.
- **Location:** Hybrid (remote with some in-person meetings in Toronto).
- **How to Apply:** Please email your resume and a brief statement of interest to the contact listed above.